

REMARKS

Thorough examination and careful review of the application by the Examiner is noted and appreciated.

Claims 1-2, 5-7 and 9-17 are pending in the application.

Claims 1-2, 5-7 and 9-17 stand rejected.

The Applicants hereby submit replacement formal drawings (changes filed 9/30/2002 have been approved) in reply to this Office Action.

Claim Rejections Under 35 USC §103

Claims 1-2, 5, 9-11 and 13-17 are rejected under 35 USC §103(a) as being unpatentable over Plat et al '751 in view of Holscher et al '292.

In the Response to Arguments section of the 06/06/2003 Office Action, the Examiner argued that, "the condensing step of Plat et al decreases the thickness of the ARC layer, a process that would necessarily affect and alter the anti-reflective properties of an ARC". Furthermore, while the Examiner agrees with the

Applicants that the stated purpose of the annealing process of Plat et al is different from the stated purpose of the Applicants' claimed process, the Examiner nevertheless concluded that, "the combination of Plat et al and Holscher et al teaches all the process steps and limitations of the Applicants' claims, including the type of substrate, the nature of the ARC, the annealing temperature, the annealing time, and the type of gas used in the annealing process". The Examiner further concluded that, "therefore, the method of the combination of Plat et al and Holscher et al would have inherently adjusted the optical properties, such as the extinction coefficient, of the ARC layer as claimed by the Applicants".

The rejection of claims 1-2, 5, 9-11 and 13-17 under 35 USC §103(a) based on Plat et al '751 and Holscher et al is respectfully traversed.

Plat et al discloses a method for reducing ARC layer removal by condensing the ARC layer. As stated by Plat et al at col. 5, lines 60+:

"The ARC layer is then condensed to approximately the desired thickness, via step 106. The condensing step 106 preferably condenses the ARC layer by about 30%. In the condensing step, the ARC layer therefore increases in density and decreases in thickness ... because the ARC layer has been condensed, the ARC layer is less subject to removal during a first resist strip and clean ... Furthermore, **condensing the ARC layer does not adversely affect the anti-reflective properties of the ARC layer.**"

The Plat et al's process achieves a completely different result than that achieved by the present invention, and therefore, is used for a completely different purpose than the method of the present invention. In the present invention method, the specific combination of the dielectric ARC layer/substrate surface is used to maximize the compatibility between the two. The Plat et al's reference is not concerned with the compatibility problem between an ARC layer and its substrate, i.e. the Plat et al reference does not recognize such a compatibility problem. As such, the Plat et al's method does not provide a solution to solve such problem. In

other words, Plat et al does not teach the desirability or the need to use other than SiON ARC material.

The present invention, to the contrary, clearly shows the desirability and the necessity of utilizing an SiONH or SiO₂ dielectric ARC layer on a substrate surface of polysilicon or silicon nitride. For instance, independent claim 1 clearly recites:

"depositing a dielectric ARC layer on said SiN_x or said polysilicon layer wherein said dielectric ARC layer is deposited of a material selected from the group consisting of SiO₂ and SiONH."

Furthermore, in the present invention specification page 3, line 8 through page 4, line 1:

"The **surface of a polysilicon layer or a silicon nitride layer is also highly reflective**, almost matching that of an aluminum layer. The high reflectivity of the surface of polysilicon or silicon nitride renders an imaging process for lithography difficult to carry out. The use of an

anti-reflective coating layer on top of the polysilicon or the silicon nitride prior to depositing a photoresist layer is therefore necessary. **For compatibility reasons, a dielectric type anti-reflective coating material is more suitable for coating the polysilicon or the silicon nitride surface."**

The present invention is therefore aimed to solve a specific problem, that was not even recognized by either Plat et al nor Holscher et al, of compatibility between layers of different materials. It is only the present invention that recognizes such problem, and therefore, it is only the present invention that teaches a solution to such problem, i.e. **a specific structure of dielectric ARC materials of SiONH or SiO₂ on top of polysilicon or SiN_x surfaces.** This is neither taught or disclosed by Plat et al or Holscher et al, either singularly or in combination thereof.

A rejection under 35 USC §103 must rest on a factual basis. In re Warner, 379 F2d 1011, 154 USPQ 173 (CCPA 1967). "The Examiner, who has the duty of advancing this factual basis, may

not, because he or she doubts that the claimed invention is patentable, resort to speculation, unfounded assumptions or hindsight reconstruction to supply deficiencies in the factual basis." Id.

In the present case, the Applicants respectfully submit that the Examiner has made unfounded assumptions that condensing step of Plat et al does not necessarily affects the anti-reflective properties and ARC when there is no solid evidence to support such assumption in either Plat et al or Holscher et al. The conclusion drawn by the Examiner that the method of the combination of Plat et al and Holscher et al would have inherently adjusted the optical properties, of the ARC layer is mere speculation or hindsight reconstruction in an effort to supply deficiencies in the factual basis in view of Plat et al and Holscher et al.

The Applicants further submit that while the Examiner attempted to combine the Plat et al reference with the Holscher et al reference, the Applicants submit that there can be no motivation for such combination. The Applicants cannot find any suggestion in either reference as to the desirability of such modification. In

re Brouwer, 37 USPQ 2d 1663 (Fed. Cir. 1996). Without such suggestions made in either of the references, the basis for the selection of the references and the purported modification must undoubtedly be hindsight drawn from Applicants' disclosure. In re Oetiker, 24 USPQ 2d 1443 (Fed. Cir. 1992). In the present case, Plat et al does not contain any teaching or suggestion that there SiON ARC layer is not compatible with the substrate surface that SiON is coated on. Similarly, Holscher et al does not contain any teaching or suggestion that the SiONH ARC layer is especially compatible with certain substrate surfaces. Lacking such suggestion or desirability, there can be no motivation in combining the two references in arriving at the present invention method.

The rejection of claims 1-2, 5, 9-11 and 13-17 under 35 USC §103(a) based on Plat et al and Holscher et al is respectfully traversed. A reconsideration for allowance of these claims is respectfully requested of the Examiner.

Claims 6 and 7 are rejected under 35 USC §103(a) as being unpatentable over Plat et al in view of Holscher et al and further in view of Demirlioglu et al '704.

U.S.S.N. 09/761,486

It is contended that the combination of Plat et al and Holscher et al does not teach a method in which the gas used in annealing is N₂, however, such is taught by Demirlioglu et al.

Claims 6 and 7 depend on independent claim 1, which clearly recites a dielectric ARC layer of SiO₂ or SiONH on a substrate surface of SiN_x or polysilicon. The Applicants have clearly shown above that such is not taught or disclosed by either one or the combination of the two primary reference of Plat et al and Holscher et al. The Applicants therefore respectfully submit that the additional reference of Demirlioglu does not lend any additional weight in a §103(a) rejection of claims 6 and 7. A reconsideration for allowance of these claims is respectfully requested of the Examiner.

Claims 1-2, 6, 9-11 and 13-16 are rejected under 35 USC §103(a) as being unpatentable over Holscher et al in view of Plat et al.

The rejection of claims 1-2, 6, 9-11 and 13-16 under 35 USC §103(a) based on Holscher et al and Plat et al is respectfully traversed.

As previously presented, the Applicants have clearly shown that the combined teachings of Holscher et al and Plat et al does not teach the invention contained in independent claims 1 and 13 since neither reference recognizes the problem of compatibility, and therefore, neither reference provides such a solution, as provided by the present invention. Furthermore, neither reference contains any teachings on the desirability of such combination, i.e. Holscher et al does not teach that their SiONH ARC layer is especially suitable for improving compatibility with certain substrate surfaces, while Plat et al does not contain any teaching that SiON ARC layer is inadequate in any way due to compatibility problems.

The rejection of claims 1-2, 6, 9-11 and 13-16 under 35 USC §103(a) based on Holscher et al and Plat et al is respectfully traversed. A reconsideration for allowance of these claims is respectfully requested of the Examiner.

Claims 5, 7 and 17 are rejected under 35 USC §103(a) as being unpatentable over Holscher et al in view of Plat et al and further in view of Sandhu et al '282.

Dependent claims 5 and 7 depend on independent claim 1, while claim 17 depends on independent claim 13. As presented above, the Applicants have clearly shown that independent claims 1 and 13 are not rendered obvious based on Holscher and Plat since neither reference recognizes the desirability of improving compatibility between different material layers, and therefore, neither reference has provided such solution. The Applicants respectfully submit the additional reference of Sandhu et al, while teaching an annealing environment of O₂, does not lender any additional weight in a §103(a) rejection. A reconsideration for allowance of these claims is respectfully requested of the Examiner.

Claim 12 is rejected under 35 USC §103(a) as being unpatentable over Holscher et al in view of Plat et al and further in view of either Lee '672 or Yao '734.

Dependent claim 12 depends on independent claim 1, which the Applicants have clearly shown is not rendered obvious based on the Holscher and Plat references. While the Applicants do not dispute that Lee or Yao et al teaches specific ranges of refractive

indexes and range of extinction coefficients of certain typical ARC layers, the Applicants respectfully submit that the basic process defined by claim 1 of utilizing a specific combination of SiO_2 or SiONH ARC layers on top of a specific substrate surface of SiN_x or polysilicon is not taught or disclosed by either one of the two primary references. The additional references of Lee and Yao do not lend any additional weight in a $\$103$ rejection of claim 12. A reconsideration for allowance of claim 12 is respectfully requested of the Examiner.

Based on the foregoing, the Applicants respectfully submit that all of the pending claims, i.e. claims 1-2, 5-7 and 9-17, are now in condition for allowance. Such favorable action by the Examiner at an early date is respectfully solicited.

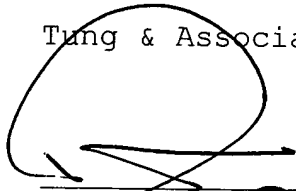
In the event that the present invention is not in a condition for allowance for any other reasons, the Examiner is respectfully invited to call the Applicants' representative at his

U.S.S.N. 09/761,486

Bloomfield Hills, Michigan office at (248) 540-4040 such that necessary action may be taken to place the application in a condition for allowance.

Respectfully submitted,

Tung & Associates



Randy W. Tung
Reg. No. 31,311
Telephone: (248) 540-4040

RWT\kd